Claims:

What is claimed is:

1. An apparatus for a laser transmission welding process for attaching a synthetic filter material to a filter tower frame in an ink jet printer cartridge, comprising:

a filter clamping fixture including

a base,

slide rods attached on first ends thereof to the base,

an optics support plate attached to second ends of the slide rods,

a movable platform for holding an ink cartridge slidably disposed on the slide rods between the base and the optics support plate,

a platform moving device for translating the platform to and from a laser welding position,

a laser beam transparent plate suspended by support legs from the optics support plate to a position between the movable platform and the optics support plate, and

a laser beam source for heating an interface between the synthetic filter material and the filter tower frame to weld the filter material to the frame.

2. The apparatus of claim 1 further comprising an XY translation table for moving the filter claming fixture during the laser welding process.

3. The apparatus of claim 1 wherein the laser beam source is selected from the group consisting of a diode laser and an Nd:YAG laser having wavelengths ranging from about 750 to about 1200 namometers.

4. The apparatus of claim 1 wherein the laser beam transparent plate is selected from the group consisting of glass, clear polycarbonate, clear polymethyl methylacrylate, and quartz.

5. The apparatus of claim 1 further comprising elastomeric pads disposed between the laser beam transparent plate and the support legs.

6. The apparatus of claim 5 wherein the elastomeric pads are comprised of a material selected from the group consisting of synthetic rubber, natural rubber, and thermoplastic elastomer.

7. The apparatus of claim 1 wherein the laser beam transparent plate comprises a non-stick coating on a surface thereof for contact with the synthetic filter material.

8. The apparatus of claim 1 wherein the laser beam transparent plate comprises a substantially planar plate for attaching a planar filter material to the filter tower frame.

9. The apparatus of claim 1 wherein the laser beam transparent plate comprises a contoured plate for attaching a non-planar filter material to the filter tower frame.

10. The apparatus of claim 1 wherein the laser beam transparent plate comprises a plate having an opening therein welding a contoured filter material to the filter tower frame.

11. A method for attaching a synthetic filter material to a filter tower frame in an ink jet printer cartridge, comprising:

providing laser beam source and a filter clamping fixture for laser beam transmission welding of the filter material to the filter tower frame, the clamping fixture including a base, slide rods attached on first ends thereof to the base, an optics support plate attached to second ends of the slide rods, a movable platform for holding an ink cartridge slidably disposed on the slide rods between the base and the optics support plate, a platform moving device for translating the platform to and from a laser welding position, and a laser beam transparent plate suspended by support legs from the optics support plate to a position between the movable platform and the optics support plate,

placing an ink cartridge onto the movable platform, the ink cartridge having the filter tower frame therein;

positioning the synthetic filter material onto the filter tower frame in the ink cartridge;

moving the movable platform toward the laser beam transparent plate so that the synthetic filter material is disposed between the transparent plate and the filter tower frame and is in intimate contact with a perimeter of the filter tower frame; and

laser welding the synthetic filter material to the filter tower frame by heating the perimeter of the filter tower frame with a laser beam from the laser beam source having sufficient power to melt a portion of the filter tower frame for melt flow of the portion of the frame through pores in the synthetic filter material.

12. The method of claim 11 wherein the laser beam source is fixed and the filter clamping fixture is moved by an XY translation table during the laser welding process.

13. The method of claim 11 wherein laser welding is conducted at a wavelength ranging from about 750 to about 1200 namometers.

14. The method of claim 11 wherein the laser beam source provides a narrow weld having a width ranging from about 0.4 to about 0.8 millimeters at a welding speed ranging from about 20 to about 40 millimeters per second.

15. An ink cartridge for an ink jet printer comprising a filter tower frame and a polyester filter material attached to perimeter of the filter tower frame using a laser beam transmission welding process, wherein the polyester filter material has a laser beam transmission rate of at least 50 % or more for laser beam wavelengths ranging from about 750 to about 1200 nanometers and the filter tower frame has a laser beam absorption rate of greater than about 50 % for laser beam wavelengths ranging from about 750 to about 1200 nanometers and wherein at least a portion of the perimeter of the filter tower frame is melt-flowed into pores of the filter material by the laser welding process.

16. The ink cartridge of claim 15 wherein the filter material comprises a substantially planar filter material.

17. The ink cartridge of claim 15 wherein the filter material comprises a contoured filter material disposed over a filter support frame.

18. The ink cartridge of claim 17 wherein the filter support frame is attached to the filter tower frame.

19. The ink cartridge of claim 15 wherein the filter tower frame has a substantially circular shape.

20. The ink cartridge of claim 15 wherein the filter tower frame has a substantially rectangular shape.

21. A method for attaching a synthetic filter to a polymeric filter tower frame wherein the filter and filter tower frame have melting points no more than about 30°C apart and wherein the filter is substantially laser beam transparent and the filter tower frame is substantially laser beam absorbent, the method comprising the sequential steps of placing the filter on the filter tower frame, pressing the filter to the filter tower frame with a pressure ranging from about 1500 to about 3000 mm Hg, and laser welding the filter to the filter tower frame around the periphery of the filter tower frame using a near infrared spectrum laser beam while maintaining pressure on the filter and filter tower frame.

22. The method of claim 21 wherein laser welding is conducted at a wavelength ranging from about 750 to about 1200 namometers.

23. The method of claim 21 wherein the filter is welded to the filter tower frame with a narrow weld having a width ranging from about 0.4 to about 0.8 millimeters at a welding speed ranging from about 20 to about 40 millimeters per second.

24. The method of claim 21 wherein the laser welding step is selected from the group consisting of contour laser welding, mask laser welding, simultaneous laser welding and quasi-simultaneous laser welding.